

SHOT PEENING OF METALS, GENERAL SPECIFICATION FOR

A. APPLICABLE SPECIFICATIONS.

A-1. The following Federal Specifications of the issue in effect on date of invitation for bids shall form a part of this specification:

QC-M-151 - Metals, General Specifications for Inspection of.
RR-S-366 - Sieves, Standards, Testing.

B. TYPE.

B-1. This specification covers shot peening of metal parts for the purpose of increasing the endurance limit of the part.

C. MATERIAL AND WORKMANSHIP.

C-1. Procedure.

C-1a. All shot peening performed under this specification shall be in accordance with a procedure approved by the contracting officer for the specified intensity and for the part under contract. Before beginning production the contractor shall submit all details of the procedure he proposes to use which determines the finish on the part and the intensity and uniformity of the shot peening.

C-1b. Any change in the procedure factors will be regarded as a change in procedure and shall require resubmission for approval.

D. GENERAL REQUIREMENTS.

D-1. See detail requirements.

E. DETAIL REQUIREMENTS.

E-1. The intensity of the shot peening as determined by the procedure outlined in paragraph F-1 shall be as specified on the drawing or in the contract within the limits indicated in Table I (see paragraph H-1).

TABLE I - Shot Peening Intensity

Nominal Intensity Designation (Increasing Intensity)	Deflection in 1-1/4 Inches Gage Length
0.009A2	0.007 - 0.011
0.012A2	0.010 - 0.014
0.015A2	0.013 - 0.017
0.018A2	0.016 - 0.020
0.021A2	0.019 - 0.023
0.024A2	0.022 - 0.026
0.026A2	0.024 - 0.028
0.003C2	0.001 - 0.005
0.006C2	0.004 - 0.008
0.009C2	0.007 - 0.011
0.012C2	0.010 - 0.014
0.015C2	0.013 - 0.017
0.018C2	0.016 - 0.020
0.021C2	0.019 - 0.023
0.024C2	0.022 - 0.026

E-2. The size of the shot used and maintained during the shot peening process shall be as specified on the drawing or in the contract within the limits indicated in Table II. The percentage by weight of broken shot in use at any time during the process shall not exceed 10 percent. (See paragraph H-2)

E-3. The parts shall be processed for a sufficient length of time to give complete coverage. (See paragraph H-3).

TABLE II - Shot Sizes Requirements

Nominal Size Inch	Maximum Size	Intermediate Sizes	Minimum Size
0.111	100% through 4,760 micron (No. 4) sieve	Min. 90% through 3,360 micron (No. 6) sieve Min. 90% retained on 2,000 micron (No. 10) sieve	Max. 3% through 1,410 micron (No. 14) sieve
.066	100% through 2,380 micron (No. 8) sieve	Min. 90% through 2,000 micron (No. 10) sieve Min. 90% retained on 1,410 micron (No. 14) sieve	Max. 3% through 1,000 micron (No. 18) sieve
.047	100% through 1,680 micron (No. 12) sieve	Min. 85% through 1,410 micron (No. 14) sieve Min. 85% retained on 840 micron (No. 20) sieve	Max. 3% through 590 micron (No. 30) sieve
.028	100% through 1,000 micron (No. 18) sieve	Min. 80% through 840 micron (No. 20) sieve Min. 80% retained on 500 micron (No. 35) sieve	Max. 3% through 350 micron (No. 45) sieve
.016	100% through 590 micron (No. 30) sieve	Min. 75% through 500 micron (No. 35) sieve Min. 80% retained on 297 micron (No. 50) sieve	Max. 3% through 210 micron (No. 70) sieve

Note: The sieve sizes referred to in this Table are in accordance with Federal Specification RR-S-366.

F. METHODS OF INSPECTION AND TEST.

F-1. At least three shot peening intensity determinations in accordance with paragraph F-2 shall be made on each machine during each shift. In case of a machine found to be producing an intensity outside the limits of the required intensity, the production of that machine for that shift shall be subject to rejection.

F-2. The shot peening intensity shall be determined by subsection of one side of a flat steel strip to the shot peening procedure used in production. The magnitude of the curvature of the strip after treatment measures the shot peening intensity. For intensities in the designation of which the letter "A" appears the test strip shown in Figure 1 shall be used. For intensities in the designation of which the letter "C" appears, the strip shown in Figure 2 shall be used. The test strips used shall be approved by the contracting officer (see paragraph H-4). The holding fixture and the method of mounting

X
the test strips shall be as shown in Figures 3 and 4. The gage for determining the deflection in gage length of 1-1/4 inches is shown in Figure 5. In using this gage, the central portion of the non-peened side of the test strip shall be placed against the plunger of the gage.

G. PACKING AND MARKING FOR SHIPMENT.

Not applicable.

H. NOTES.

H-1. Recognized factors in determining the shot peening intensity are:

- a. Material.
- b. Section Thickness
- c. Hardness of Work.

H-2. In selecting shot sizes consideration should be given to the following factors:

- a. Shape of parts.
- b. Size of fillets or scratches (small shot to get into small fillets and etc.).
- c. Finish (small shot for fine finish).
- d. Intensity desired.
- e. Abrasive effect.

H-3. The time of exposure should give complete coverage. The coverage is frequently gaged by eye. A more reliable method is to expose a series of test strips for varying lengths of time under a given set of shot peening conditions, then plot a curve of gage reading against time of exposure. The curve should flatten off at a time which gives complete coverage.

H-4. The response of test strips to shot peening is influenced by surface finish, method of rolling and other factors in addition to those indicated in this specification. It is essential that test strips used respond in the same manner as strips upon which the data in the specification is based. At the time of preparation of this specification, satisfactory strips were available from the following sources:

Pangborn Corporation
Hagerstown, Maryland

American Foundry Equipment Company
Mishawaka, Indiana

H-5. The attention of Ordnance personnel is directed to a report on shot peening, Serial No.M-238 issued by the National Defense Research Committee.

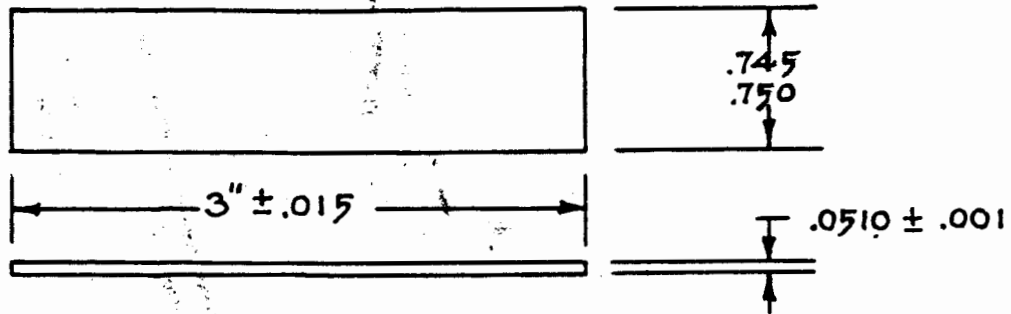
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NOTE: Copies of this specification may be obtained from the Office, Chief of Ordnance, Army Service Forces, Washington, D.C.

Proof Read bf/rww

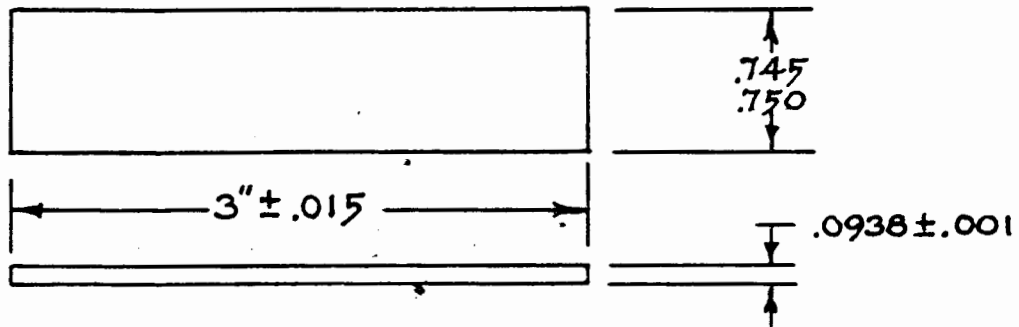
TEST STRIP "A"



HARDNESS: ROCKWELL "C" 44-50
FLATNESS: $\pm .0015$ " ON GAGE SHOWN IN FIG. 5
SIDES AND ENDS MAY BE SHEAR FINISH.
REMOVE BURRS AND BREAK CORNERS.

FIG. 1.

TEST STRIP "C"



HARDNESS: ROCKWELL "C" 44-50
FLATNESS: $\pm .0015$ " ON GAGE SHOWN IN FIG. 5
SIDES AND ENDS MAY BE SHEAR FINISH.
REMOVE BURRS AND BREAK CORNERS.

FIG. 2.

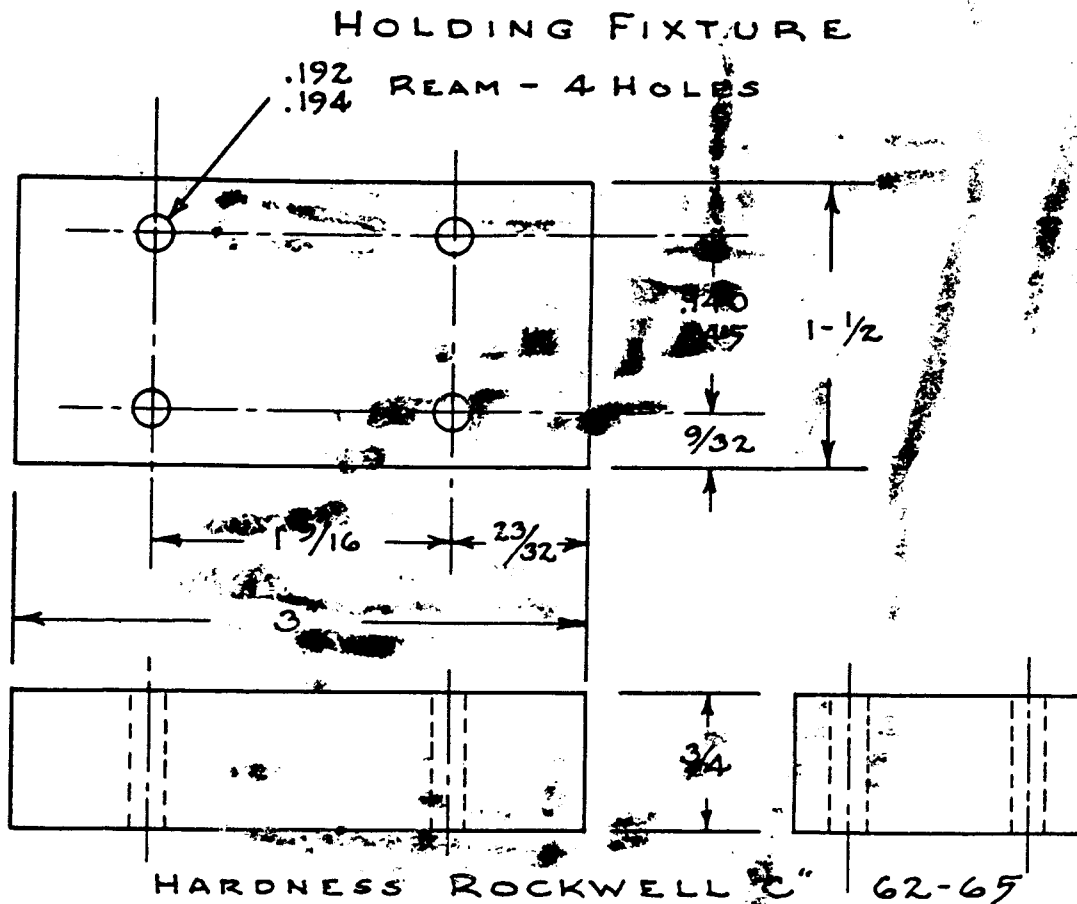


FIG. 3

ASSEMBLED TEST STRIP AND HOLDING FIXTURE

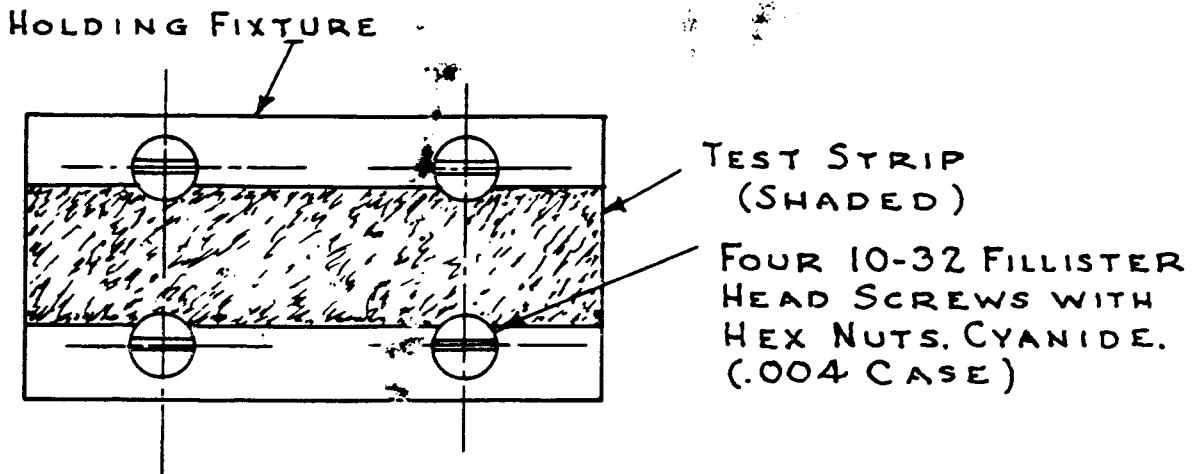
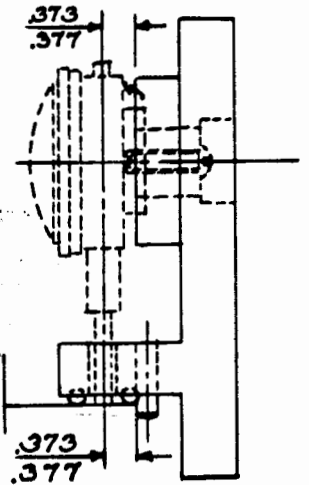
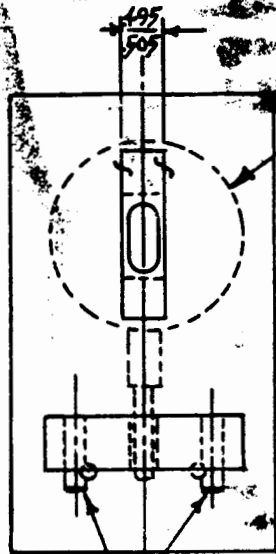


FIG. 4.

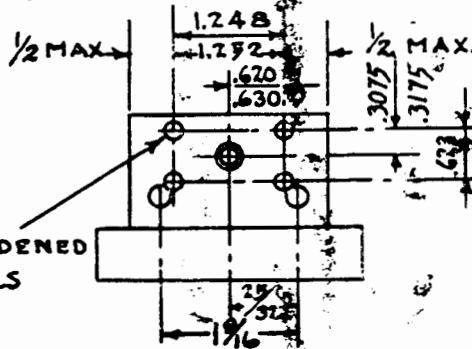
GAGE FOR DETERMINING DEFLECTION

SUITABLE DIAL
INDICATOR GAGE
GRADUATED IN
THOUSANDTHS.



CONTACT SURFACE OF
ALL BALLS TO BE
IN ONE PLANE $\pm .002$

$\frac{1}{4}$ " HARDENED DOWELS



FOUR $\frac{3}{16}$ " HARDENED
STEEL BALLS

FIG. 5